STUDIES OF THE SPECIES IN THE GENUS CICADELLA LATREILLE (HOMOPTERA) OF NORTH AMERICA, NORTH OF MEXICO.

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In working over the species in the genus *Cicadella*, which from time to time had gathered in the writer's collection and in collections loaned for study, it was found impossible, from the present literature, to determine and properly place all the forms at hand. Some of these closely related and undescribed forms obviously caused considerable confusion at times and it became evident that a review with further study was quite necessary.

In reviewing this genus the author was confronted by several intricate questions. These questions were communicated to and discussed with other scientists interested in this particular genus. In some of these communications the main points of the author were sustained and a good deal of encouragement was given, while in one or two cases it was pointed out that his views were probably misguided. In such cases of doubt these views were dropped for possible further consideration and study.

Liberal use has been made of "sub-species" in place of "variety"; all forms which show a more or less constant distinction from the typical species, and which it would not, by structural characters, be safe to call species, although in some cases they may be such, are placed as sub-species. All others, more or less varying in color combinations and designs from the typical form, have been given a varietal name where such was deemed advisable for the purpose of identification. In this paper little use is being made of external genital characters for the reason that where the differential characters were mostly wanted the genital differences were too small or too variable to depend on, and preference was given to other structural characters, color designs, and patterns.

The "Reivew of the *Tettigonidæ*" by Ball, 1901, has been taken as basis for this study. This valuable work, which was published twenty years ago, is today still indispensable for the

study of the sub-family *Cicadellinæ*, but since its date of publication a number of changes have been made and some additions have been found of which no records have been made; these changes and additions have all been included in this paper.

Van Duzee, 1916 and 1917, has been followed in the higher names, viz.: Family *Cicadellidæ*, sub-family *Cicadellinæ*, tribe *Cicadellini*, and genus *Cicadella*, as neither literature nor time was available for the checking-up of this.

This genus can be recognized by the two ocelli placed on the posterior half of disk of vertex, about equal distance between eyes and center, portion of the front encroaching upon the dorsal part of vertex, the ledges over the antennal sockets are not prominent and the anterior tibia are not sulcate. Distant, 1908, mentions, in separating it from *Kolla*, that "the lateral margin of the vertex in line with the inner margins of eyes." This is rather misleading, and there is no doubt that what he meant was that the lateral margins were not in line with the outside of the eyes, as they are in *Kolla*.

A number of suggestions have been made; the very first one is to consider *Cicadella viridis* Linnæus as a possible accidental introduction which did not become established on this continent.

In the study of *hieroglyphica*, the writer "struck a snag" in trying to recognize the species from the short and incomplete description by Say. On this particular point the author sought advice from other interested friends.

The answers received were varied, both concurring and contrary to a suggestion of the author. But, as it is exceedingly difficult to prove or disprove the questions that arose, it is better left as it is for the present. It is rather unfortunate that Say's type is not in existence; if it were, there would never have been the slightest doubt, but, as it is, his short description will answer for another species in this genus as well.

Cicadella confluens Uhler has been given specific rank, for the reason given in the article, and the figure will assist in explaining doubtful points. Consequently, Ball's variety *uhleri* has been shifted to be a variety of *confluens*.

Tettigonia compta Fowler, 1900, has been revived as a subspecies, a rank to which it seems surely entitled. It appears to have a different form of habitation, seeking the higher and more arid regions of Mexico. This, together with its great difference of appearance will warrant the designation of sub-species for it.

Kolla similis Walker, 1851, has been included in this genus as it seems to compare better with the type *Cicadella viridis* Linnæus than it does with the type *Kolla insignis* Distant, although I have never seen specimens of the latter type. Taking this species out of *Kolla* may possibly improve that genus, the characters of which at their best are none too good for our known, North-American species.

Cicadella circellata Baker, 1898. It is quite possible that Signoret's *atropunctata* is the same as this; further study is therefore warranted, and particularly of material from Brazil.

Through the courtesy of Mr. Edmund Gibson the writer has had the privilege of studying a collection of specimens in this genus from the United States National Museum. Dr. F. E. Lutz kindly gave permission to examine the material in the collection of The American Museum of Natural History, and Mr. H. G. Barber turned over his very valuable collection to my disposal. Mr. E. P. Van Duzee, Dr. E. D. Ball, and others have kindly assisted with desirable specimens and were kind enough to answer correspondence on this subject. To these gentlemen I am very grateful for their unfailing assistance and to them I wish here to express my sincere appreciation. These collections, together with my own, accumulated material, have made this paper possible.

Cicadella viridis Linnaeus, 1758

This species has been included in our faunal list on the strength of a single record by Provancher, 1889. The specimen was seen in Provancher's collection at Quebec, Canada, and examined by Van Duzee, 1912. Its identity cannot be questioned. This record is rather unique for such a widely distributed species of the Old World. It appears in most of the European lists as a common species abundantly collected; it is reported from the British Islands (Edwards 1888), across the Danish peninsular (Jensen-Haarup 1915–1920), through Russia (Oshanin 1907), to Japan (Onuki 1901); in Europe as far south as Italy (Ferrari 1895). It occurs in damp, grassy locations along edges of swamps and meadows.

Had this species once gained foothold and become established here, there is every good reason to believe that it, like so many other Hemiptera, would find but little difficulty in maintaining itself, if not actually spreading. At least we might

expect to corroborate this old record of Provancher, 1889. Although this record is annotated by "Peu commune, Cap Rouge," it is apparently without a definite date, but must have been collected previous to the appearance of the publication, which was issued about August, 1889, thirty-three years ago.

Until further collecting of this species on our continent occurs, it may be well to suppose that Provancher's specimen was an introduced, stray individual, and that the species so far has not become established here, which explains its absence in all other collections and local lists. Taxonomically it would be most desirable to have this species with us as it represents type of family, subfamily, tribe and genus, but economically we are better off without it. It may be well to suggest to collectors in the northern section of our territory, and especially in Eastern Canada, to be on the look-out for the possible occurrence of this species.

Cicadella marathonensis, Olsen, 1918.

Recently described and figured by the author, in the Bulletin of The American Museum of Natural History, from a female specimen collected by Dr. F. E. Lutz, at Marathon, Texas. It is regrettable that this should be the only specimen known, but it is so distinct from all our other known *Cicadellidæ* that it cannot be confused with any other species.

It has been suggested by one of our eminent cicadelists that this species may belong in the genus *Kolla* and perhaps be one of the species described there. This point has been carefully considered; although there is very little difference between the genera *Cicadella* and *Kolla* yet *marathonensis* fails to compare with the latter. The vertex is more obtuse, the area between the eyes and ocelli is slightly shallow (not foveate as in *Kolla*), and the sides of the pronotum are entirely different from that of *Kolla*, more nearly like those of *Cicadella*.

Cicadella multilineata Fowler, 1900.

This very large species was described by Fowler from Pinas Altos in Chihuahua, Mexico, and it seems that it has not been reported on since. It is quite distinct both in size and color from all our other known North American species.

Vertex well produced, markings of vertex, pronotum, scutellum and veins of elytra black in strong contrast to the yellowish-gray

ground color, with apex of vertex, anterior part of pronotum, cell between the two claval veins and subcostal cell strongly tinged with bright yellow. Size: Length 10.1 to 10.5 mm., width 2.7 to 2.9 mm.

Twelve specimens were collected by Mr. H. G. Barber at Huachuca Mountains, Arizona, July 12th to August 3rd, 1905, which agree admirably well with Fowler's description and figure except as to the color of the underslde. They fail to have the bright red venter and legs described for the species, but have a pale, orange-yellow color with indications of the varigated black and testaceous rather weakly shown.

Cicadella hieroglyphica Say, 1831.

This species was described by Say from specimens collected in Arkansas. Its color and markings are subject to variation but Say mentions only one color-form and neglects altogether the details of the markings which are so important distinguishing characters at the present time. He apparently made an error or else he did not describe the commonest form when he mentions in his description "hemelytra obsoletely spotted, nervures being pale." The writer has not seen any example among the great number examined which could truly be said to have "nervures pale," except in some forms where it was evident that the pigmentation in general had not developed, or in a few examples in which the nervures were pale near the base of the elytra and for a very short distance beyond. It is not probable that Say should have selected such a specimen or specimens to describe; at least this part is a serious discrepancy in his description as throughout the whole series of *hieroglyphica* and its allied forms (except one extreme subspecies, which may, when enough collecting has been done, be considered a good species), the veins appear dark. Is it possible that Say should have had a *gothica* before him? This would be an exceedingly hard question to settle as there are no types in existence. The description in general can be applied to both species except for the "pale nervures" which would fit *gothica* much better than *hieroglyphica*. However, taking all in all and arguing for and against, it is not advisable at this time to propose any change in the taxonomy, if indeed there is to be any, but, at the same time, it is well for those that try to identify *hieroglyphica* by Say's original description to bear in mind that they have dark veins in general.

Several new forms have been recognized as additional subspecies and varieties of this species; they could not well be identified with *hieroglyphica* or any of its described varieties. It was, therefore, obvious that the describing and naming of these forms would materially lessen the difficulty in identifying both *hieroglyphica* and *confluens*. In most cases and as far as this study has revealed, these new forms are more or less confined to certain geographical areas.

Typical form: Vertex well produced, obtusely conical, about a right angle; length of head, .8–.9 mm.; width, including eyes, 1.7 mm., anterior lateral margins bulging from just before the eyes, taking up with the obtuse apex, posterior margins rather evenly and strongly arched, disk evenly and gently convex, a very slight depression between the eyes and ocelli, sculpturing not very strong, general appearance rather smooth. The general color varies considerably from yellowish-gray to greenish, and from a brick-red to a grayish-green or brown with indistinct spots and blotches on head and pronotum, with the characteristic black markings surrounding an imaginary light T and usually with streaks, more or less conspicuous, and dark veins on the elytra. Males and females of about the same color.

Say, in his description of this species, mentions only one color form, i. e., "dull rufous"; this must then be considered the typical color. It is found very commonly in this color, from which it varies into several other colors as mentioned above.

The "slaty form" mentioned by Dr. Ball, 1901, should, without doubt be referred to the variety *dolobrata* rather than to *hieroglyphica*, (see variety *dolobrata*). This color transition is more evident in the females than in the males of these two forms.

In Van Duzee's Catalogue, 1917, the distribution for this species and the there mentioned three varieties is given in common. It seems obvious and quite important that the distribution should be considered apart for each of these forms, at least in this case. Dr. Ball, 1901, arranged them in two groups and gave the distribution of each group, which was more nearly correct. These two groups will not always be found in the same territory; at least one of the groups has quite a distinct distribution. There are several other closely related, yet undescribed forms (which will be treated in the pages to follow), that have been the cause of a good deal of confusion and it is obvious that local distribution must be considered for

each one of these forms even though in some instances repetition will occur.

The range of this species, typical form, extends from the Rockies about Colorado, east throughout Nebraska and Iowa to Illinois, south-west to New Mexico and Arizona. In the East it is represented by a single capture in Tennessee, De Long 1906, and another single example in the writer's collection from La Grange, Georgia, 17, VIII, 1918, taken by Dr. A. H. Sturtevant. A quite northern record is Wisconsin, which is probably correctly identified by Saunders and De Long, 1917.

Cicadella hieroglyphica var. **dolobrata** Ball, 1901.

Shape and characters similar to that of typical *hieroglyphica* but color darker, especially in the males, which range from all black with but few light markings, to black specimens irrorate with white on vertex and pronotum.

The characteristic markings of the species are usually obsolete in the males, but not so obscure in the females and sometimes rather well defined. Their color is slate to nearly black; I have never seen a female that would answer entirely to the color description of this variety.

Following is the result of the study of two collections: First lot: Langdon, Mo. VII, 14, —VIII, 28, H. G. Barber. Seventeen specimens, nine males, (typical *dolobrata*), eight females, rather slate gray in general appearance, with a good deal of light pattern in strong contrast to the markings on the vertex and anterior part of the pronotum. They would very well pass for Ball's "slaty form" but are undoubtedly the females of the above mentioned males. The lot is fairly constant and collected in a space of about six weeks. Second lot: From "C. Mo. 96." (abbreviation for Central Missouri 1896?), U. S. National Museum Collection. Ten specimens pasted on a card, seven of which are typical *dolobrata* males, the remaining three were females with vertex and pronotum as in the former lot, but a shade darker on the elytra. These are almost indisputably males and females of the same brood.

The distribution of this variety follows that of the typical *hieroglyphica* except that it is not reported from as many places. Dr. Ball, 1901, gives the same general distribution for both, additional distributions are Olsen, 1918, Boulder, Colorado; De Long, 1916, one specimen from Colliersville, Tennessee.

There is no doubt that this variety will be found wherever the typical form occurs, if thorough collecting is done.

Cicadella hieroglyphica sub-species **lutzi** n. sub-sp.

Male: Vertex shorter and wider in proportion than in either *hieroglyphica* or the variety *dolobrata*, eyes more prominent, two longitudinal, slightly elevated ridges passing over the ocelli, leaving the central disk and the area between the ocelli and eyes slightly but distinctly concave. The whole vertex has otherwise a rather flat appearance. Pronotum rather short, and only slightly convex, lateral margins of the elytra, from dorsal aspect, tapering gradually to an acute point.

Color. A shining black spot on the apex of vertex and face, the reflexed portion of the face is finely lineated with brown, curved lines, lateral edge of vertex just behind the reflexed portion of face with a strong, short, black line almost touching the eyes. Front yellowish-white, mottled with black, but little broken up; this mottling is extended so that it connects with the apical spot at four places, a strong, median light stripe running from the black spot at the apex to the clypeus, sometimes interrupted by the black mottling crossing it. Genæ pure white, immaculate. Loræ bright yellow, fuscous along the clypean suture. Clypeus cream yellow with a dark, narrow median line. Pectus black with a broad white spot just below the eyes followed by a smaller one. Vertex with the characteristic *hieroglyphica* "T," but differing principally from the typical *hieroglyphica* as follows: A strong black line following around the base of the "T" up along both sides of the stem, following along under the divergent and recurved parts of the "T," going back obliquely across the ocelli, striking against the eyes, a lateral branch shooting forward between the ocelli and eyes, terminating before it reaches the margin in a somewhat angulate spot; the light stem of the "T" passes uninterruptedly through to the apical spot.

The suture between the reflexed portion of the face and vertex marked with a delicate, black line, pronotum dark with an anterior light band irregularly marked with black and dark brown, markings more pronounced, and of a vermiculate character on the anterior band. Scutellum with two black vittæ running from basal margin slightly inside and parallel to the lateral margins until it strikes the dark, impressed suture, directly backwards striking the lateral margins before the tip. Elytra bluish-black, the costal margin and margins of claval suture bright bluish-gray, sometimes with green mottling, nervures dark, cells irregularly sparsely spotted or mottled with gray.

Females unknown.

This sub-species can be separated from typcial *hieroglyphica* and var. *dolobrata* by its shorter, broader and flatter vertex, smaller size and more pointed posterior. Its general dark-

bluish and somewhat shining color will readily separate it from *hieroglyphica* while the light markings of the vertex will serve to distinguish it from *dolobrata*.

Described from eighteen males, specimens all from Arizona. Five males from "Phoenix, Arizona, R. Kunze Collection" American Museum of Nat. Hist. collection; seven males from "Phoenix, Arizona, R. Kunze Collection"; and one male from "Phoenix, Arizona, 6-1-02," H. G. Barber Collection. Two males from "Arizona C. U. Lot. Cornell U .Lot 411 and 414," one male from "Arizona U. Lot P. R. Uhler Collection," collection of United States National Museum. In time, it may prove to be a perfectly good species. This can better be ascertained when the female becomes known. At present the rank of sub-species will serve every purpose. Male holo-type and three male para-types in The American Museum of Nat. Hist.; four male para-types in Mr. H. G. Barber's collection; four male para-types in U. S. Nat. Mus. Coll.; six male para-types in author's collection.

Cicadella hieroglyphica sub-species **barberi** n. sub-sp.

Small, slender, pale yellowish-green, scarcely marked. Vertex, anterior pronotum, scutellum, costal margins of the elytra and all beneath from a pale straw-yellow to a slight greenish-yellow. Vertex with apical black spot, disk very lightly marked with fuscous, pattern scarcely discernible, in some specimens entirely obliterated, leaving the vertex clear yellow with only the eyes, ocelli and apical spot dark. Pronotum without maculation, posterior disk yellowish-green. Scutellum with faint traces of maculations. Elytra yellowish-green. Face and all beneath pale straw color, immaculate or slightly marked. Veins usually pale in the females.

Four females, from "Phoenix, Arizona," American Mus. of Nat. Hist. Four females, "Phoenix, Arizona, May 25, to June 8, 1902," H. G. Barber Collection. One female "S. Col." One female, "Pecos, New Mexico, August 11, Ckll.," and one female, "Santa Fe, New Mexico, Ckll.," United States Nat. Mus.

Seven males from "Glen, Sioux Co., Neb.," H. G. Barber Collection and one male, "Col. Aug. Uhler," U. S. Nat. Mus. Collection, may possibly be referred to this sub-species; they have a trifle more markings on the vertex than the females as above described and also the veins of their elytra are set off with a darker color.

Female holo-type and two female para-types in The American Museum of Natural History Collection. Male allo-type, four male para-types and two female para-types in H. G. Barber's collection. Three female para-types in U. S. Nat. Mus. Coll. Three female and three male para-types in author's collection.

Cicadella hieroglyphica var. **inscripta** n. var.

Shape and size similar to *hieroglyphica*. Face yellow, mottled with brownish. Vertex bright yellow, the disk washed with green, usual markings shining black, apical spot prominent. Pronotum dark bluish-green on disk, anterior margin more or less bright yellow, with a series of prominent black inscriptions across the entire width, which is vanishing in some specimens. Scutellum yellow with usual black margins. Elytra bright bluish-green with the margin of the claval suture yellowish-green, and the costal margins yellow to yellowish-green. Face mottled with testaceous. Venter and all beneath pale yellow, except the claws, which are dark, and a few fuscous spots on the sternum of some of the specimens.

Five females, three labeled "Arizona (Col. Baker)," one "Pecos ,New Mexico, Aug. 26 Ckll., *Verbesina exauriculata*," (Probably food plant), one "Colorado Springs, Colo., July 21, 77." All from the U. S. Nat. Mus., Washington, D. C.

Female holo-type and three female para-types in U. S. Nat. Mus. one female para-type in author's collection.

Cicadella confluens Uhler, 1862.

When Uhler described this species he placed it in the genus *Proconia* and compared it with *Proconia costalis*, now known as *Oncometopia lateralis* Fabricius. From this it is evident that the insect he described appeared to him rather closer related to *lateralis* than to any of the *Tettigonia* species. It is not easy to say why he did this for his species lacks characters to admit it into this group, perhaps its appearance was rather coarse for *Tettigonia*.

Ball, 1901, reduced Uhler's *confluens* to a variety of *hieroglyphica* and described two other varieties, *dolobrata* and *uhleri*. After studying a considerable number of specimens I have come to the conclusion that *confluens* should be considered as a distinct species with *uhleri* as a variety of it. These always possess the broadening and shortening of the vertex which Dr. Ball, 1901, refers to in the introduction of his paper. Besides

this, the front or face is considerably less convex and usually very pale with much less marking than is found in *hieroglyphica* and its varieties. Comparing it with *hieroglyphica* both in width and length, its head is broader and shorter in comparison to its total length; the lateral margins of vertex are straighter; vertex not quite so convex; elytra longer, mostly with a spotted pattern seldom displaying any stripes; general color dark brownish to bluish-black; markings on vertex quite different, the longitudinal bar of the T and the black margins bordering it are proportionately longer and thinner, appearing more drawn out and crowded together; the apical black spot is usually joined by the other black markings, sometimes barely separated; face is pale, sometimes slightly mottled; front broader, flatter, and not quite so strongly inflated.

This species is undoubtedly confined to the extreme western states, specimens are determined from British Columbia, Washington, Idaho, and California.

Certain forms of *hieroglyphica*, especially from Colorado, (perhaps a new variety) very much resemble this species and have probably been the cause of confusion; they can, however, always be separated from it by the front being darker, more mottled, narrowed and more inflated or convex, and their shorter elytra and they do not have the slender black and light lines on the disk of the vertex. Some of these specimens in the National Museum collection where labeled with a Uhler ms. name.

Cicadella confluens var. **uhleri** Ball, 1901.

This variety compares well with Uhler's *confluens* except in color, which is a grayish-green with bluish, greenish or brownish mottling, much lighter than typical *confluens*. Vertex, face, scutellum and costal margins of elytra usually brighter and more yellowish; black markings of vertex and scutellum are more delicate and fainter, sometimes vanishing; it also has longer elytra.

Occurring practically with *confluens*, perhaps ranging more eastward toward the Rocky Mountains. Specimens at hand from Washington, California, Nevada and Colorado. These localities conform with Dr. Ball's (1901) statement of distribution which names the states in the Rocky Mountain region except Montana and follows westward to the coast. Tucker

(1907) confirms the Colorado locality, whereas Gibson and Cogan (1915), if their determination is correct, extend the distribution considerably eastward, giving the western half of the state of Missouri.

Cicadella gothica Signoret, 1855.

This widely distributed species, occurring practically over the entire continent, extends its range considerably northward over a wider stretch than any other member of the genus. It is common in all the north-eastern states extending into Canada. Provancher, 1889, lists it as *Diedrocephala hieroglyphica* Say common at Cape Rouge, Ont. Mr. E. P. Van Duzee, 1914, reports it as abundant throughout the year at San Diego County, California. In the south-east it seems to cease at Tennessee, De Long, 1916; South Carolina, Metcalf, 1915; North Carolina, Olsen, 1918.

Specimens at hand from Arizona vary slightly in size and markings from those of elsewhere: (a) about the same size but all markings on vertex obliterated or nearly so, elytra unicolorous with veins faintly discernible, pale; (b) ranging considerably smaller in size, markings on vertex present and elytra of a deeper color with veins pale.

It is readily separated from the *hieroglyphica* group by its designs of the vertex. The elytra of this species has the nervures pale. It does not exhibit as great variation as *hieroglyphica*.

Cicadella circellata Baker, 1898.

It seems somewhat doubtful whether this name is valid or not. There is a good reason to believe that *atropunctata* Signoret is the same thing; his description fits tolerably well, although based on a specimen collected in Brazil, but the illustration is indeed very misleading and poor, as are many of the illustrations in the same work. However, this will need further study and especially of material from the south. Meantime, it may well be carried along as above.

Lawson, 1920, is evidently of the same opinion since he in his recent paper on "The Cicadellidæ of Kansas" calls this species *atropunctata* Signoret.

Cicadella occatoria Say.

Described by Say from Indiana. Fowler, 1900, gives a very fine color figure of this insect. It is variable to some extent in the amount of green and yellow color, also the markings show a gradation of various tints from reddish-brown to brown and black.

Dr. Ball, 1901, lists *Tettigonia compta* Fowler as a straight synonym of this. I would hesitate that our common form in the south-eastern states should be identified with *Tettigonia compta* because of Fowler's description and particularly his color figure which is very well executed. Therefore, I would separate this form from *occatoria* and consider it a a sub-species at least, to which, I am sure, it is entitled. Dr. Ball, 1901, records it as common in Florida, Mississippi and Texas. To this must be added Gibson and Cogan, 1905, common in eastern Missouri; De Long, 1916, specimens swept from various places in Tennessee; Metcalf, 1915, two localities in North Carolina; and Lathrop, 1917 and 1919, three localities in South Carolina. The type locality is in Indiana. Its range extends far to south of our fauna.

Cicadella occatoria sub-species **compta** Fowler.

Comparing this form with the true *occatoria* it will at once be seen to be of much redder color, but lacking the green. On the vertex the two outer of the four red vittæ are much broadened on the reflexed portion of the face, and are subdivided into two or three narrower stripes on this place; they are really a continuation of a series of ten or twelve red arches on either side of the face, which extend up to this part of the vertex and take up with the stripes running back over the pronotum and clavus. The inner pair of vittæ form a decided loop at a distance of two-thirds from the base of the head and run back over the pronotum, scutellum and clavus. The fifth or central vitta commences on the pronotum and runs back over it and the scutellum.

The red vittæ of the elytra are much broadened and leave only narrow, yellow vittæ between them. The apex of the elytra is hyaline and the characteristic "blackish tip with yellowish band" as mentioned in Say's description, is wanting.

This form seems to frequent more elevated and arid regions of Mexico, whereas typical *occatoria* is usually found along the south-eastern coast-line at comparatively low elevations.

Six specimens in the collection of Mr. H. G. Barber come from Huachuca Mountain, Arizona, July 13 to 22, 1905.

Cicadella dohrnii Sign.

I have seen only a few examples of this species from Arizona and Mexico. It was described by Signoret from Mexico, and without doubt this is the insect which later was described by Baker, (1898, p. 286) as *Tettigonia aurora* and by Fowler (1900, p. 269, Pl. XVIII, Fig. 5) as *delicata*. This has been pointed out by Dr. Ball, 1901, who gives a very comprehensive description and an excellent figure by which it can be readily determined.

Cicadella similis Walker, 1851.

In comparing this species with the description of the genus *Kolla* Distant, 1908, I find that it does not agree very well. In the first place, the vertex is obtuse, rounded anteriorly rather than subconically narrowed; in the second place, the fovea next to the eye is scarcely discernible, variable, and amounts in many cases to a shallow depression which is so often seen in the genus *Cicadella*.

The face has the lateral areas somewhat strongly striate, but this is also a character in most of the *Cicadella* species. The centrally longitudinal area is sometimes flattened, and sometimes gently rounded, the dark and light arches meeting a narrow, light, central longitudinal vitta. The outline or profile of the face is markedly different from our species of both *Cicadella* and *Kolla*, bending rather abruptly just before the clypeus and the latter itself having quite a bend, these two bends producing a wavy appearance to the lower part of the profile of the head. Considering the above characters, I suggest that this species be placed in the genus *Cicadella*, where I think its color pattern, shape and general appearance will be in greater agreement.

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EXPLANATION OF PLATE XXXVI.

Fig. 1. Dorsal view of *Cicadella multilineata* Fowler.
Fig. 2. Dorsal view of *Cicadella hieroglyphica* Say.
Fig. 3. Dorsal view of *Cicadella hieroglyphica* subsp. *lutzi* n. subsp.
Fig. 4. Dorsal view of *Cicadella hieroglyphica* subsp. *barberi* n. subsp.
Fig. 5. Dorsal view of *Cicadella confluens* Uhler.
Fig. 6. Dorsal view of *Cicadella occatoria* Say.
Fig. 7. Dorsal view of *Cicadella similis* Walker.
a, front view of face; *b*, side view of head; *c*, apical half of elytra.